Academic Talent Management of High-Achieving Students in Competition-Based Nonformal Education: Integrating Higher Order Thinking Skills and Deep Learning (A Case Study of Olimnus)

by Yusnaldi Yusnaldi

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ABSTRACT (9 pt)

Objective: *Incidental, outcome-oriented coaching practices have often shaped the development of high-achieving students without fully supporting sustainable academic talent management. This study aims to analyze academic talent management in nonformal education by integrating educational competitions, higher-order thinking skills (HOTS), and deep learning. This research employed a qualitative case study design conducted at Olimnus, a provider of competition-based nonformal education. Data collection involved document analysis, observations, and in-depth interviews with administrators and high-achieving students. They were systematically analyzed using a thematic analysis approach to identify key patterns and themes. The findings indicate that educational competitions at Olimnus serve not as event-based activities, but as management tools for academic talent development, including planning, identification, development, evaluation, and sustainability. The integration of HOTS in assessment design and academic coaching serves as a core mechanism for developing students' analytical, evaluative, and reflective thinking skills. Well-planned, HOTS-based talent management practices foster deep learning, as reflected in shifts in students' learning orientations toward conceptual understanding, critical reflection, and independent learning. This study offers a novel contribution by proposing an integrative model of academic talent management in nonformal education that connects educational competitions, HOTS, and deep learning within a sustainable managerial cycle. This contribution extends the understanding of academic talent management beyond formal education settings and offers practical implications for designing systematic, sustainable, competition-based talent development strategies.*

INTRODUCTION

Improving the quality of education is a strategic agenda at both national and global levels, particularly in responding to the demands of the 21st century, which emphasize critical thinking, complex problem-solving, creativity, and lifelong learning (Fanny, 2019). Global educational paradigms indicate a shift from an exclusive focus on learning outcomes toward strengthening meaningful and sustainable learning processes (deep learning). The deep learning approach positions learners as active subjects who not only acquire surface-level knowledge but also develop deep conceptual understanding, reflect on their learning processes, and apply knowledge across various real-life contexts (Fullan et al., 2017). This paradigm shift underscores that academic achievement should not be measured solely by scores or rankings, but by the quality of learning processes that foster higher-order thinking skills and intellectual autonomy among learners.

The development of superior human resources in Indonesia has become a national priority, including efforts to nurture high-achieving students. However, the development of high-achieving students is still often narrowly defined as the attainment of outcomes, such as awards or medals, in academic competitions. An overemphasis on outcomes risks neglecting the quality of learning processes and the development of higher-order thinking skills (HOTS), which serve as the foundation for sustainable academic achievement and long-term learning capacity (Brookhart, 2010). This condition highlights

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the need for an educational management approach that focuses not only on performance outcomes but also on the management of learning processes that promote deep conceptual understanding.

In practice, the coaching and development of high-achieving students in various educational institutions, including nonformal education settings, remain largely incidental and event-based. Such coaching is typically conducted intensively prior to specific competitions, without support from a systematic and sustainable academic talent management framework. This pattern of development tends to prioritize short-term targets and overlooks continuous learning processes that foster deep learning. Conversely, the concept of talent management in human resource management emphasizes the importance of strategic, systematic processes for identifying, developing, evaluating, and sustaining talent (Collings & Mellahi, 2009). However, within the educational context, particularly in the management of high-achieving students, this concept has not been comprehensively adopted as part of educational management strategies.

Existing academic studies on high-achieving students have predominantly focused on formal education contexts, such as elite schools, acceleration programs, or specialized tracks for gifted students, with an emphasis on psychological, motivational, and individual aspects of academic achievement (Subotnik et al., 2011). Meanwhile, research examining academic talent management in nonformal education contexts remains relatively limited. Academic competitions are more often positioned as tools for selection and performance measurement rather than as managerial instruments for sustainable academic talent development. In fact, when managed through appropriate educational approaches, competitions can serve as mechanisms for talent identification, reinforce HOTS through assessment practices that require analysis and evaluation, and facilitate deep learning through reflective, meaningful learning experiences (Tasrif, 2022).

Recent studies emphasize that schools should develop high-achieving students not only through outcome-based indicators such as competition results, but also through process-oriented learning approaches that promote critical and reflective thinking. Research shows that students who are consistently engaged in higher-order thinking skill (HOTS) based learning demonstrate stronger adaptability and long-term academic resilience (Saido et al., 2015). In line with this view, integrating higher-order thinking skills (HOTS) into learning processes can significantly improve students' ability to solve complex and unfamiliar problems (Heong et al., 2011). Furthermore, findings indicate that learning models such as problem-based learning are effective in improving students' higher-order thinking skills and preventing superficial learning patterns (Arviani et al., 2023). Therefore, strengthening learning processes that prioritize HOTS is essential in ensuring sustainable academic excellence (Saibin et al., 2024).

In addition, recent literature highlights the importance of implementing structured and sustainable talent management systems within educational contexts, particularly in nonformal settings. Effective educational management plays a significant role in supporting the development of students' interests and talents through systematic programs (Nasution et al., 2026). Moreover, structured competition-based and project-based learning approaches can improve students' motivation and academic performance (Saibin et al., 2024). These findings suggest that adopting a systematic and integrated approach is crucial for optimizing the development of high-achieving students.

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Furthermore, broader educational system perspectives also emphasize the importance of resilience and continuity in learning systems to ensure long-term student development (Dülks et al., 2023).

These conditions highlight the need for studies examining how competition-based nonformal education can systematically manage academic talent among high-achieving students by integrating higher-order thinking skills (HOTS) development and deep learning approaches. Therefore, this study aims to analyze the management of academic talent among high-achieving students through a case study of the Olimnus platform as a form of competition-based nonformal education and to formulate an academic talent management model that integrates educational competitions, HOTS, and deep learning. In addition, this study examines how competition-based nonformal education can effectively implement academic talent management for high-achieving students. This study is expected to make theoretical contributions to the development of educational management scholarship, particularly by adapting academic talent management concepts to nonformal education contexts, and to provide practical contributions in the form of a replicable talent management model to foster the sustainable and meaningful development of high-achieving students.

RESEARCH METHOD

This study employs a qualitative approach with a descriptive case study design aimed at gaining an in-depth understanding of academic talent management for high-achieving students in competition-based nonformal education. The qualitative approach was chosen because it enables the researcher to comprehensively explore processes, dynamics, and managerial practices implemented in real-world contexts, particularly in integrating educational competitions, higher-order thinking skills (HOTS), and deep learning within academic talent management (Sukardi, 2018).

The case study approach was selected because this research focuses on a single specific context, namely the Olimnus platform as a provider of competition-based nonformal education. Olimnus was chosen as the research case due to its characteristics of organizing sustainable academic competitions and implementing continuous development processes for high-achieving students across various educational levels. Through a case study design, this research is expected to generate an in-depth and contextual understanding of the patterns of academic talent management applied in practice.

Research participants were determined using purposive sampling by considering the relevance of informants to the research focus. The participants included program managers and competition organizers who are directly involved in the planning and implementation of academic talent management, as well as high-achieving students who participate in competitions as beneficiaries of the management system. In addition, competition-related documents, such as implementation guidelines, assessment blueprints, and evaluation reports, were used as data sources to strengthen the research findings.

Data collection was conducted through document analysis, semi-structured interviews, and observations. Document analysis was employed to examine policies, procedures, and mechanisms of academic talent management applied in the organization of competitions. Semi-structured interviews were conducted to explore informants'

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perspectives, experiences, and perceptions regarding the processes of talent identification, development, evaluation, and sustainability. Observations were carried out to gain direct insights into the implementation of competitions and mentoring processes, particularly in the context of integrating HOTS and deep learning into learning activities and assessment practices.

Data analysis was conducted simultaneously with the data collection process by following the stages of data reduction, data display, and conclusion drawing (Ridder, 2014). Data obtained from multiple sources were analyzed to identify patterns, themes, and relationships among concepts relevant to academic talent management. The analysis process was conducted iteratively until a comprehensive understanding of academic talent management practices in the context of competition-based nonformal education was achieved.

To ensure the trustworthiness of the data in a more systematic and replicable manner, this study implemented a series of structured procedures. First, data collection was conducted in three stages: document analysis, semi-structured interviews, and observations, each guided by predefined protocols and instruments. Interviews were conducted using semi-structured guidelines, recorded with participants' consent, and transcribed verbatim immediately after each session to maintain data accuracy. Second, source triangulation was performed by comparing data obtained from program managers, high-achieving students, and official competition documents, while method triangulation was carried out by cross-checking findings from interviews, observations, and document analysis at each stage of data collection. Third, member checking was conducted by returning interview transcripts and preliminary interpretations to selected informants for verification and confirmation of meaning. Fourth, to ensure dependability, all research procedures, including data collection processes, coding schemes, and analytical decisions, were documented systematically in an audit trail, allowing external review of the research process. Finally, confirmability was maintained by minimizing researcher bias through reflective field notes and by ensuring that all interpretations were grounded in empirical data collected during the study. Through these step-by-step procedures, the study ensures that its methodological logic can be transparently followed and potentially replicated by other researchers.

In this study, the researcher acted as the primary instrument in data collection and analysis, functioning as a non-participant observer who did not intervene in the implementation of academic talent management activities but focused on understanding and interpreting the phenomena within their natural context. The researcher maintained reflexivity throughout the research process by documenting personal assumptions, potential biases, and analytical decisions in reflective field notes to ensure the credibility of the findings. Ethical considerations were strictly upheld by obtaining informed consent from all participants prior to data collection, in which they were informed about the purpose, procedures, and voluntary nature of their participation. Participants' confidentiality and anonymity were ensured by using pseudonyms and securely storing all research data. In addition, the researcher ensured that the study did not cause any harm to participants and that all information obtained was used solely for academic purposes in accordance with established research ethics principles.

Data trustworthiness was ensured through source and method triangulation. Source triangulation was carried out by comparing information obtained from program

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managers, participants, and competition-related documents, while method triangulation involved comparing findings from interviews, observations, and document analysis. In addition, the researcher conducted member checking with key informants to verify the accuracy of interpretations and ensure that the findings accurately reflected field conditions, thereby enhancing the credibility and reliability of the research results.

RESULTS AND DISCUSSION

Results

Talent Management in Education Management

Table 1 presents a checklist of findings on academic talent management from an educational management perspective, indicating the fulfillment of the functions of planning, organizing, implementation, control, and sustainability in managing the academic talents of high-achieving students in competition-based nonformal education. The findings presented in the table serve as the basis for analytical discussion to interpret how academic talent management practices at Olimnus align with the principles of educational management.

Table 1. Checklist of Findings on Academic Talent Management from an Educational Management Perspective

Educational Management Function	Academic Talent Management Indicators	Present	Absent	Data Source
Planning	Competition implementation guidelines	✓		Documents
	Periodic competition calendar	✓		Documents
	HOTS-based assessment blueprint	✓		Documents
	Long-term talent development objectives	✓		Interviews
Organizing	Competition management structure	✓		Documents
	Division of roles among organizing team	✓		Documents
	Participant management workflow	✓		Observation
Actuating (Implementation)	Continuous competition implementation	✓		Observation
	HOTS-based academic coaching	✓		Documents
	Reflective learning and evaluation activities	✓		Interviews
Controlling & Evaluation	Cross-competition participant performance records	✓		Documents
	Mentor feedback	✓		Interviews
	Internal program evaluation	✓		Documents

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	Repeated student participation	✓	Participant data
Sustainability	Access to advanced coaching programs	✓	Documents
	Talent pool management	✓	Interviews

Source: by Researcher, 2025

Educational Competition as Managerial Instrument

The research findings at Olimnus indicate that educational competitions are not positioned as incidental activities, but rather as integral components of a planned academic talent management system. Competitions are organized periodically with clear implementation guidelines and structured competition calendars, thereby functioning as planning instruments within educational management. This structured approach demonstrates that competitions are systematically embedded within the overall framework of student development. As a result, competitions at Olimnus do not function as supplementary activities, but are integrated into the planning and implementation of high-achieving student development programs.

Integration of HOTS in Academic Talent Development

Table 2 presents the composition of cognitive levels of Olimnus competition questions based on the revised Bloom's Taxonomy as the basis for analyzing the integration of higher order thinking skills (HOTS) in academic talent development. The presentation of this composition aims to empirically demonstrate that competition assessments do not merely emphasize content mastery, but are predominantly designed to measure and develop students' higher-order thinking skills.

Table 2. Cognitive Level Composition of Olympiad Questions at Olimnus

Cognitive Level	Percentage Range of Questions	Question Characteristics
C1–C2 (Remembering & Understanding)	15–20%	Measures understanding of basic concepts and terminology
C3 (Applying)	20–25%	Application of concepts to specific contexts or situations
C4 (Analyzing)	25–30%	Analysis of relationships among concepts and logical reasoning
C5 (Evaluating)	15–20%	Evaluation of arguments, solution accuracy, and decision-making
C6 (Creating)	10–15%	Construction of new solutions or problem-solving strategies

Source: by Researcher, 2025

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Deep Learning as an Outcome of Academic Talent Management

Another key finding indicates that academic talent management in competition-based nonformal education at Olimnus contributes to the development of deep learning among high-achieving students. Deep learning does not emerge as a direct result of competition alone, but rather as a consequence of planned, sustainable, and higher-order thinking–oriented talent management practices. This impact is reflected in a shift in students' learning orientations, from a primary focus on score attainment toward conceptual understanding and reflection on the learning process.

Integrative Model of Academic Talent Management in Nonformal Education

Figure 1 presents an integrative model of academic talent management in competition-based nonformal education, developed through a synthesis of the study's empirical findings and grounded in established theoretical perspectives. The model illustrates the interrelationships among educational competitions, higher-order thinking skills (HOTS), and deep learning within a sustainable managerial process. Educational competitions function as instruments for the selection and evaluation of academic talent, reflecting principles of performance-based talent identification as discussed in talent management theory by Collings & Mellahi (2009). HOTS is positioned as the core mechanism for developing higher-order cognitive abilities, aligning with the conceptualization of higher-order thinking proposed by (Brookhart, 2010). Meanwhile, deep learning serves both as an outcome and as an indicator of the effectiveness of academic talent management, consistent with the learning paradigm emphasized by (Fullan et al., 2017), which highlights meaningful and transferable learning processes. All of these components are operationalized through educational management functions, including planning, coaching, monitoring, and sustainability, which correspond to fundamental managerial processes in educational management as outlined by (Bush, 2020). By integrating these established theoretical foundations, the model not only reflects empirical findings from the Olimnus case but also extends existing knowledge by contextualizing academic talent management within competition-based nonformal education settings.

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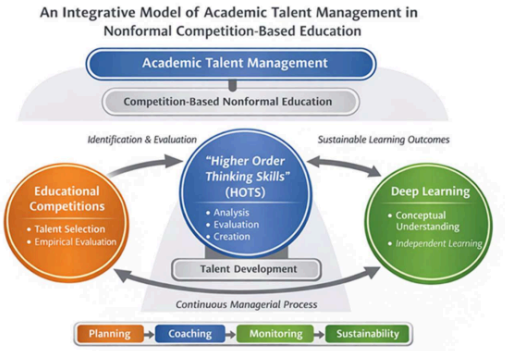

Figure 1. Integrative Model of Academic Talent Management in Competition-Based Nonformal Education

Discussion

Talent Management in Education Management

Table 1.1 indicates that academic talent management in competition-based nonformal education has been implemented systematically in accordance with the principles of educational management. The fulfillment of indicators within the planning function suggests that academic talent management is deliberately designed through the development of implementation guidelines, competition calendars, and HOTS-based assessment blueprints, ensuring that the development of high-achieving students is not incidental (Bush, 2020). This finding is also consistent with the framework of strategic talent management proposed by Collings and Mellahi (2009), which emphasizes systematic processes of talent identification, development, and alignment with organizational objectives.

Within the organizing function, the presence of a management structure and clearly defined roles indicates that academic talent development is carried out through a coordinated organizational system. This enables the talent management process to operate consistently and not be dependent on particular individuals, aligning with the principles of organizing in educational management and strategic management (Robbins et al., 2014). Meanwhile, within the implementation function, the continuous organization of competitions and HOTS-based coaching underscores that academic talent is not merely selected but actively developed through learning experiences that emphasize higher-order thinking processes (Suyatno et al., 2023).

Controlling and evaluation function are reflected in utilization performance recap of participants and feedback of supervisor as a basic of monitoring student development. This approach show that academic talented management is carried evidenced-based, so the coaching decision based on empiric data and sustainable evaluation (Zeithaml et al., 1988). The controlling and evaluation functions are reflected in the use of participant performance records and mentor feedback as the basis for monitoring students' development. This approach indicates that academic talent management is conducted in an evidence-based manner, whereby coaching decisions are grounded in empirical data

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and continuous evaluation (Collings & Mellahi, 2009). Overall, the discussion of this table confirms that the academic talent management practices implemented are aligned with the principles of educational management that emphasize quality and the sustainable development of learners (Fullan et al., 2017).

Educational Competition as Managerial Instrument

In the practice of academic talent identification, the findings at Olimnus reveal that competition results are utilized to map students' potential and patterns of thinking abilities, rather than merely to determine rankings. These findings reinforce the work of Subotnik et al., (2011), who argue that the development of high-achieving students requires a continuous, performance-based talent identification system rather than a one-time selection process (Uno, 2023). By using competition data as the basis for talent mapping, Olimnus demonstrates academic talent management practices that align with a performance-based talent identification approach.

Another prominent finding is the use of higher order thinking skills (HOTS)-based questions as a core characteristic of competitions at Olimnus. The assessment blueprints and assessment characteristics indicate that the competitions are designed to measure students' abilities in analysis, evaluation, and problem-solving. These findings are consistent with previous research that emphasizes the role of HOTS-based assessments in capturing higher-level cognitive processes Brookhart (2010) which emphasizes that HOTS-based assessments not only function to measure learning outcomes but also serve as learning tools that promote conceptual understanding and the development of higher-order thinking skills (Zohar & Dori, 2003). In the context of Olimnus, HOTS-based competitions serve a dual function as instruments for both the selection and development of academic talent.

From the perspective of control and evaluation, the findings at Olimnus indicate that cross-competition participant performance records and mentor feedback are used as the basis for monitoring students' development and adjusting coaching strategies. This practice aligns with the principles of evidence-based management in education, whereby managerial decisions are grounded in empirical data and continuous evaluation (Robbins et al., 2014). Moreover, this approach supports the view that Zeithaml et al., (1988) regarding the importance of continuous evaluation in maintaining service quality consistency, including within the context of nonformal education services.

Building on these findings, future research is encouraged to further explore the applicability and scalability of competition-based academic talent management models across diverse educational contexts, including formal education institutions and different nonformal learning environments. Comparative studies involving multiple platforms or institutions may provide deeper insights into the effectiveness and adaptability of such models in fostering high-achieving students. In addition, future studies could examine the long-term impact of integrating competitions, HOTS, and deep learning on students' academic performance, critical thinking development, and career trajectories. From a methodological perspective, further research is recommended to employ mixed-method approaches that combine qualitative insights with quantitative measurements to strengthen the validity of findings. Longitudinal designs may also be utilized to capture the sustainability of talent development over time, while experimental or quasi-experimental methods could be applied to test the effectiveness of specific competition-

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based interventions in enhancing higher-order thinking skills and deep learning outcomes.

The sustainability aspect also emerges as an important finding at Olimnus, where high-achieving students are positioned as part of a talent pool that is continuously developed through their involvement in subsequent competitions. This finding is aligned with the concept of strategic talent management proposed by Collings & Mellahi (2009), which emphasizes that talent management should be long-term oriented and integrated with organizational strategy. In the context of nonformal education, this practice demonstrates that competitions can serve as a sustainable mechanism for academic talent management rather than merely producing short-term achievements.

Integration of HOTS in Academic Talent Development

Based on the cognitive level composition presented in Table 1.2, Olimnus competition questions are dominated by higher cognitive levels (C4–C6), accounting for more than half of the total questions. The predominance of analysis-, evaluation-, and creation-based questions indicates that the competition assessments are designed to measure the quality of students' thinking processes rather than merely their mastery of basic concepts. These findings reinforce the perspective of Brookhart (2010), who emphasizes that HOTS-based assessments play a crucial role in revealing complex thinking abilities and serve as a foundation for academic talent development (Ratnawati & Narimo, 2022). The relatively high proportion of questions at the C4 and C5 levels indicates that students are consistently confronted with demands to analyze relationships among concepts, evaluate arguments, and determine the most appropriate solutions. In the context of academic talent development, sustained exposure to such questions fosters the development of critical and reflective thinking skills, which are key characteristics of high-achieving students. This finding is consistent with (King et al., 1988), who argue that the effective development of HOTS occurs when learners are routinely engaged in challenging higher-order thinking tasks.

The presence of C6-level questions, although in a more limited proportion, indicates the availability of opportunities for students to develop creative abilities and more complex problem-solving skills. From an academic talent management perspective, C6-level questions function as indicators of talent differentiation, as they are able to distinguish students with advanced thinking abilities from those who remain focused on procedural application. This finding supports the perspective of Subotnik et al., (2011), who argue that the development of high-achieving students requires increasingly complex cognitive challenges as their abilities progress.

Meanwhile, the proportion of questions at lower to middle cognitive levels (C1–C3) is maintained within certain limits to ensure a balance between mastery of basic concepts and higher-order thinking skills. This approach indicates that the integration of HOTS in Olimnus' competitions is implemented in a measured manner without neglecting students' conceptual foundations. Within the context of meaningful learning, this balance is essential to enable students to build strong conceptual understanding as a basis for the development of deep learning (Fullan et al., 2017).

Deep Learning as an Outcome of Academic Talent Management

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"Now, I do not immediately look for the answer, but instead try to understand the problem first. If my answer is incorrect, I try to find out why it is wrong so that the mistake does not recur."

These findings demonstrate characteristics of deep learning, including active engagement, reflection, and meaning-making in learning experiences, as described by Biggs et al. (2022), who argue that deep learning is characterized by efforts to understand meaning and relationships among concepts. In the context of Olimnus, deep learning is fostered through repeated exposure to competitions based on higher order thinking skills (HOTS). Interviews with competition organizers reveal that the questions are deliberately designed to consistently encourage students to engage in analytical and reflective thinking.

"We do not merely aim to create difficult questions, but questions that force students to think. Through this approach, it becomes evident who truly understands the concepts."

Such cognitive challenges encourage students to develop deeper thinking strategies, ensuring that learning does not remain at a procedural level. This is consistent with the perspective of Fullan et al., (2017), who emphasize that deep learning emerges when learners are actively engaged in higher-order thinking processes and sustained reflection. In addition, evaluation and feedback mechanisms within academic talent management further reinforce the development of deep learning. Interview findings indicate that students receive feedback not only on learning outcomes but also on the thinking processes they employ.

"After the competition, we usually discuss where the thinking errors occurred, not merely whether the answers were right or wrong."

This approach is consistent with the findings of Hattie & Timperley (2007), who emphasize that feedback focused on learning processes and strategies plays a crucial role in fostering deep learning. In the context of academic talent management, such feedback helps students reflect on their thinking processes and independently refine their learning strategies.

From an educational management perspective, the emergence of deep learning among high-achieving students indicates that systematically managed educational competitions can function as meaningful learning environments. Deep learning serves as an indicator of the quality of academic talent management, as it reflects the effectiveness of the system in developing students' thinking skills, learning autonomy, and academic perseverance. Consequently, academic talent management at Olimnus not only produces competitive achievements but also builds a foundation for long-term learning. Overall, this discussion confirms that deep learning represents a tangible outcome of integrated and sustainable academic talent management. Interview findings further reinforce the evidence that the integration of educational competitions, HOTS, and reflective evaluation effectively enables students to achieve deeper conceptual understanding.

Integrative Model of Academic Talent Management in Nonformal Education

Figure 1 represents an integrative model of academic talent management in competition-based nonformal education, developed through a synthesis of the study's empirical findings. The model emphasizes that academic talent management should not be understood as a partial or event-based activity, but rather as a managerial system that

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connects educational competitions, higher-order thinking skills (HOTS), and deep learning within a sustainable cycle. The positioning of academic talent management as the overarching framework indicates that all activities related to the development of high-achieving students are governed by the functions of educational management.

At the initial stage of the model, educational competitions are positioned as managerial instruments that function for talent selection and empirical evaluation. The research findings show that competitions are utilized not merely to determine rankings, but as sources of performance data used in the identification and mapping of academic talent. This is consistent with the perspective of Subotnik et al., (2011), who emphasize that the development of high-achieving students requires a continuous, performance-based identification system rather than a one-time selection process. Accordingly, competitions in this model serve as the entry point for academic talent management.

HOTS is placed at the core of the model as the central mechanism for academic talent development. The integration of HOTS enables talent managers to shift the focus from outcome-oriented achievement toward the quality of students' thinking processes. Empirical findings indicate that HOTS-based assessments are used to identify students' abilities in analysis, evaluation, and creation, allowing competitions to function as process-oriented diagnostic assessments. The positioning of HOTS as a link between competitions and deep learning aligns with (Brookhart, 2010), who asserts that HOTS-based assessments play a crucial role in revealing learners' thinking processes and supporting the development of meaningful learning.

The deep learning component in this model is positioned both as an outcome and as an indicator of the effectiveness of academic talent management. Interview and observation findings reveal that students experience a shift in learning orientation, from merely pursuing competition scores toward developing conceptual understanding and reflecting on their learning processes. This reflects the characteristics of deep learning described by Biggs et al. (2022) namely learning that emphasizes meaning-making, conceptual connections, and critical reflection. Within the context of this model, deep learning emerges as a result of sustained learning processes arising from the integration of competitions and HOTS within an academic talent management system.

The bidirectional arrows connecting HOTS and deep learning in Figure 1 illustrate the reciprocal relationship between higher-order thinking processes and sustained learning outcomes. The deep learning that develops subsequently enhances students' readiness to engage in subsequent competitions, thereby creating an adaptive cycle of academic talent development. This cyclical pattern is consistent with the view of Fullan et al., (2017), who argue that deep learning develops through repeated learning experiences, reflection, and the application of knowledge across diverse contexts.

At the bottom of the model, the managerial functions of planning, coaching, monitoring, and sustainability emphasize that all academic talent management processes are operationalized through the principles of educational management. These functions ensure that academic talent development does not stop at a single competition cycle, but continues through long-term talent pool management. This approach is aligned with the concept of strategic talent management, which underscores the importance of sustainable talent development that is integrated with organizational strategy (Collings & Mellahi, 2009).

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CONCLUSION

Competition-based nonformal education should be reconceptualized not as incidental or event-driven activities, but as a strategic and systematic framework in which educational competitions function as core managerial instruments within academic talent management. The findings from the Olimnus case demonstrate that the integration of competitions, higher-order thinking skills (HOTS), and deep learning forms a coherent system that supports not only the identification and evaluation of academic talent, but also its continuous and sustainable development. Importantly, this study confirms that sustainable academic achievement is fundamentally rooted in the quality of learning processes rather than merely in competitive outcomes. In this framework, HOTS serves as a key mechanism for developing analytical and evaluative thinking, while deep learning represents both the ultimate goal and a central indicator of effective talent management. Therefore, repositioning educational competitions within a structured managerial system is essential for transforming competition-based nonformal education into a meaningful, sustainable, and impact-oriented model of academic talent development.

This study has several limitations. First, it focuses on a single case, namely the Olimnus platform, which may limit the generalizability of the findings. Second, the reliance on qualitative data provides in-depth insights but does not capture measurable changes in students' performance over time. Additionally, the findings are shaped by a specific institutional context that may not be fully replicable in other settings. These limitations indicate that the results should be interpreted contextually. Despite these limitations, this study offers important contributions. Theoretically, it extends the discourse on academic talent management by positioning educational competitions as part of a structured and continuous developmental system rather than merely evaluative tools. Practically, it provides insights for educators and nonformal education providers in designing competition-based programs that emphasize sustained learning processes, including the integration of HOTS-based assessment, continuous performance tracking, and aligned mentoring systems. More broadly, this study highlights the strategic role of nonformal education as a flexible space for implementing systematic and sustainable talent development.

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This study recommends that providers of competition-based nonformal education design integrated and long-term–oriented coaching systems by utilizing competitions as data sources for academic talent management. Future research is encouraged to examine the application of this model in different nonformal education contexts and to employ quantitative or mixed-method approaches to more broadly test the effectiveness of the proposed model.

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